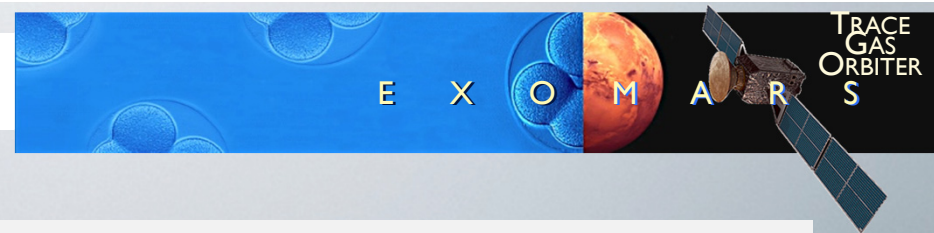


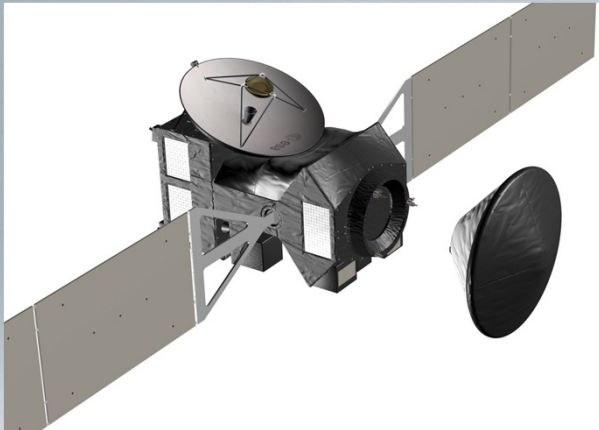


Proposed ExoMars 2016 Trace Gas Orbiter Science Mission Overview

O. Witasse, *European Space Agency*
M. Allen, *Jet Propulsion Laboratory, California Institute of Technology*



- ESA and NASA have agreed to embark on a joint Mars robotic exploration programme:
 - ➔ Initial missions have been proposed for the 2016 and 2018 launch opportunities;
 - ➔ Missions for 2020 and beyond are in a planning stage;
 - ➔ The joint programme's ultimate objective would be an international Mars Sample Return mission.



2016

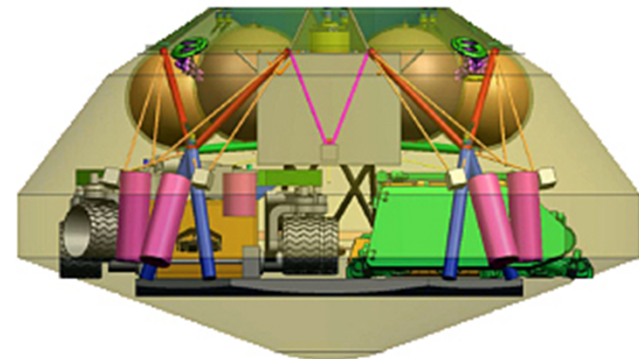
Proposed ESA-led mission

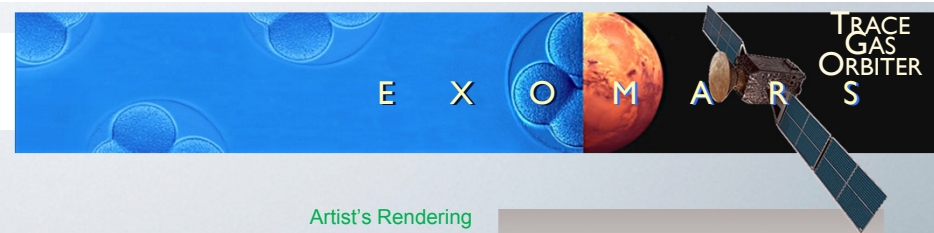
Baseline launch Vehicle:	NASA – Atlas V 431
Orbiter:	ESA
Payload:	NASA-ESA
Science Ops:	ESOC MOC; NASA-JPL SRA/SOC
Telecom:	NASA-ESA
EDL Demo:	ESA

2018

Proposed NASA-led mission

Baseline Launch Vehicle:	NASA – Atlas V 531
Cruise & EDL:	NASA
Rover 1:	ESA
Rover 2:	NASA



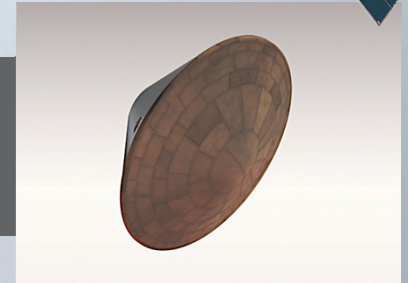


2016

TECHNOLOGY OBJECTIVE

→ Entry, Descent, and Landing (EDL) of a payload on the surface of Mars.

Artist's Rendering

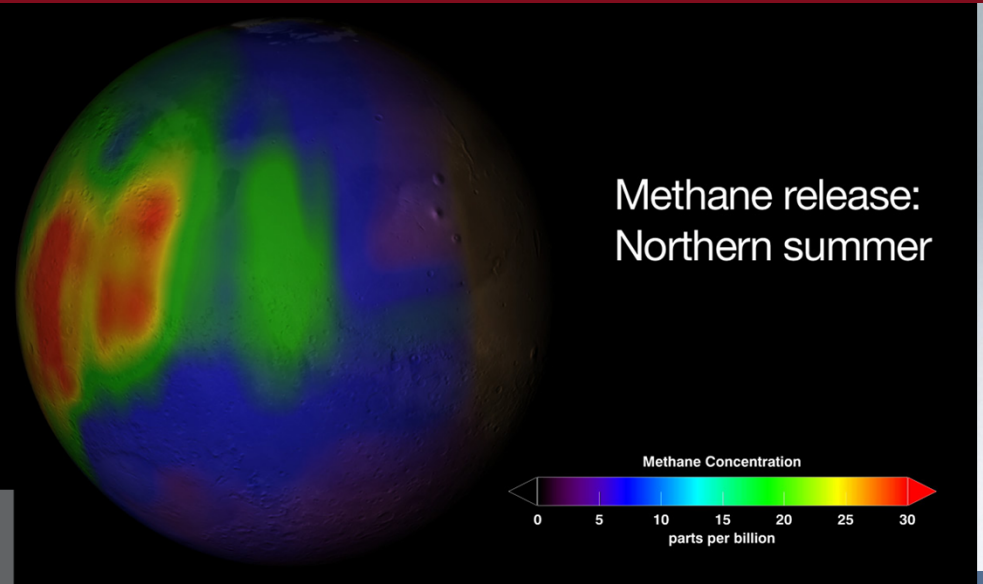
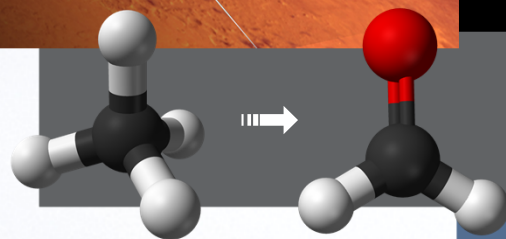


SCIENTIFIC OBJECTIVE

→ To study Martian atmospheric trace gases and their sources.



Artist's Rendering



→ Provide data relay services for landed missions until 2022.



PRIORITISED GOALS

1. **Detect a broad suit of atmospheric trace gases and key isotopes with high sensitivity:**
2. **Map their spatial and temporal variability with high sensitivity:**
3. **Determine basic atmospheric state by characterising P, T, winds, dust and water aerosol circulation patterns**
4. **Map their spatial and temporal variability with high sensitivity (\leq ppb):**

INSTRUMENTS

MATMOS
(ppt)

USA, CAN
F

H/W
Science

NOMAD
(10^{-1} ppb)

B, E, I, UK
USA, CAN

EMCS
(P, T, dust, ices, H₂O)

USA, UK
F

MAGIE
(Full hemisphere WAC)

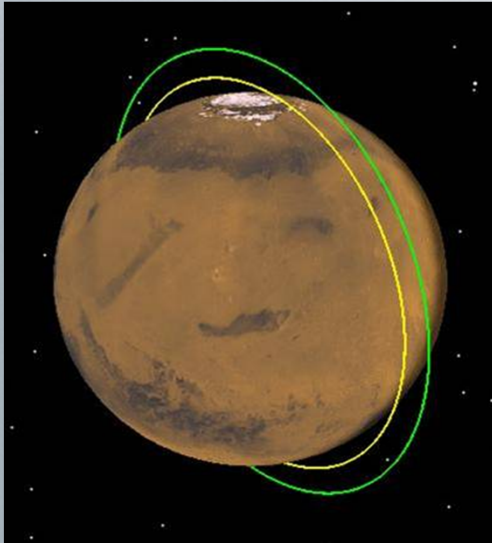
USA, UK
B, F, RUS

HiSCI
(HRC 2 m/pixel)

USA, CH
UK, I, D, F



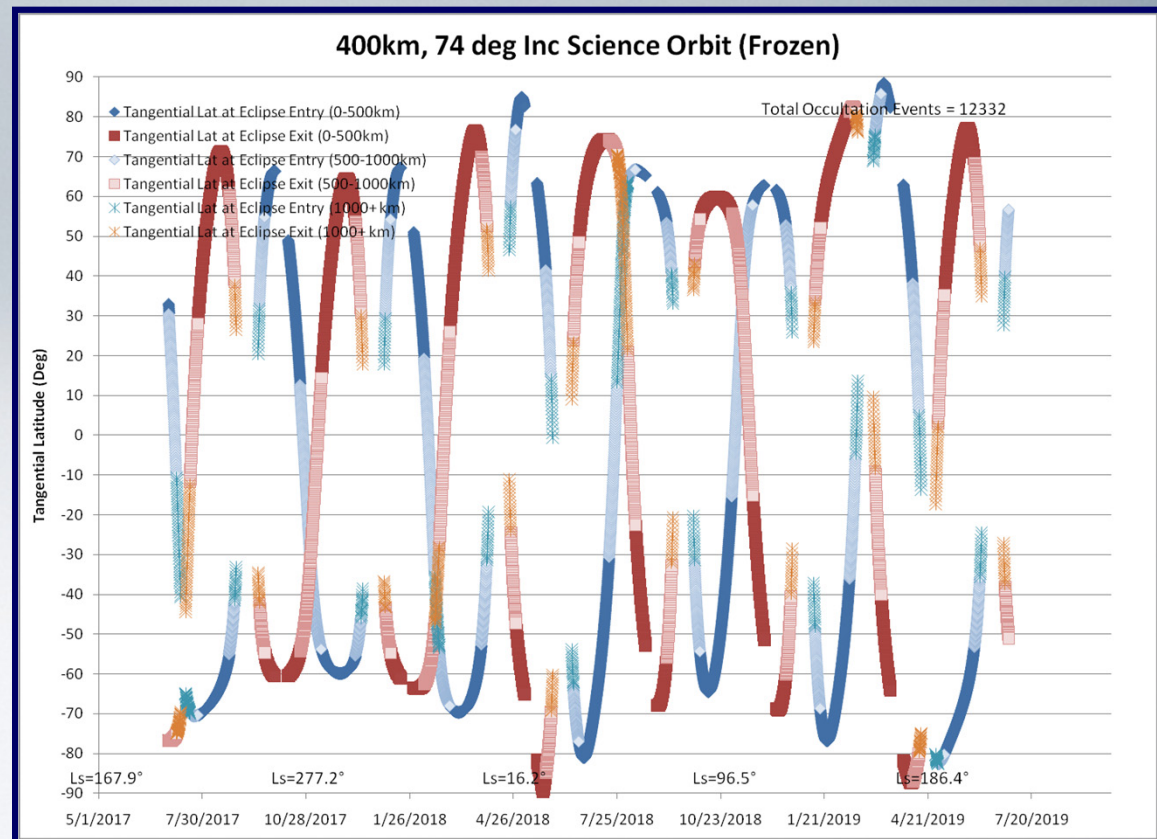
Excellent coverage of
high-priority objectives.

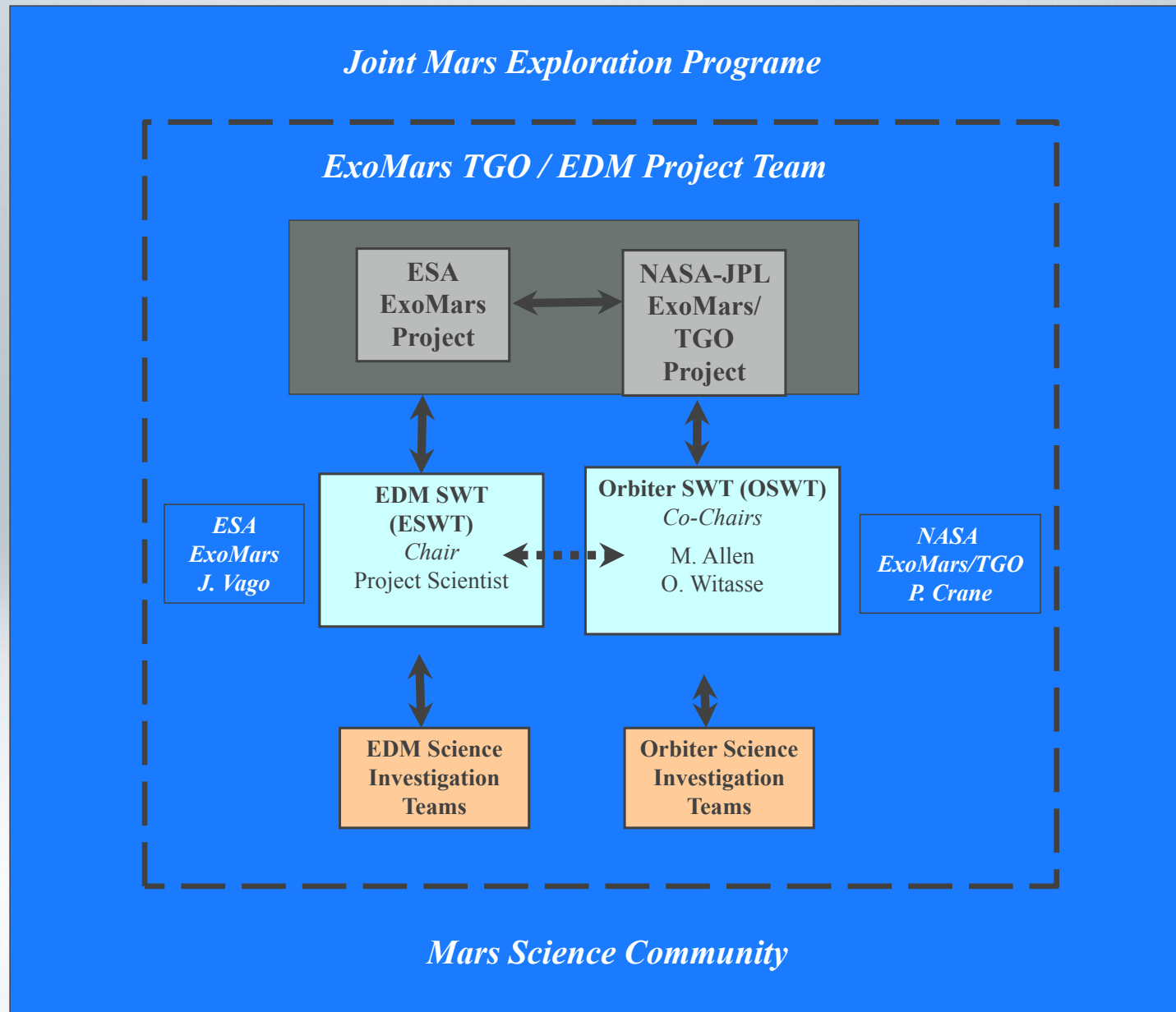


Orbital inclination: $74^\circ \pm 10^\circ$
 Orbital period: 2 hours
 Altitude: 350-400 km
 Duration: 1 Martian year

Observation modes

- Solar occultation
- Nadir
- Limb







7-27 Jan 2016	Proposed Launch window
16 Oct 2016	Descent Module Release
19 Oct 2016	Mars Orbit Insertion, EDL Relay Coverage and EDM Landing
27 Oct 2016	End of surface operations and Relay Coverage
29 Oct 2016	Inclination change to Science Orbit
31 Oct 2016	Apocenter reduction
8 Nov 2016	Start of Aerobraking Phase
Spring 2017	End of Aerobraking Phase, start of the science!
11 Jul-11 Aug 2017	Superior Conjunction
14 Jan 2019	Start of Data Relay Phase for the two rovers



As for many missions/project, one could expect to broaden the mission community by releasing a call for

Guest Investigator

and

Inter-Disciplinary Scientist

a few years before launch.

Concluding remarks



Pre-decisional – for Planning and Discussion Purposes Only